b. Method references for other radionuclides. When the identification and measurement of radionuclides other than those listed in 41.9(2) are required, the following references are to be used, except in cases where alternative methods have been approved in accordance with 41.12(455B).

(1) "Procedures for Radiochemical Analysis of Nuclear Reactor Aqueous Solutions," H. L. Krieger and S. Gold, EPA-R4-73-014, Environmental Protection Agency, Cincinnati, Ohio 45268 (May 1973).

(2) "HASL Procedure Manual," edited by John H. Harley. HASL 300, ERDA Health and Safety Laboratory, New York, NY (1973).

c. Radionuclide detection limits. For the purpose of monitoring radioactivity concentration in drinking water, the required sensitivity of the radioanalysis is defined in terms of a detection limit. The detection limit shall be that concentration which can be counted with a precision of plus or minus 100 percent at the confidence level (1.960 sigma where sigma is the standard deviation of the net counting rate of the sample).

(1) To determine compliance with 41.8(1)*"a,"* the detection limit shall not exceed 1 pCi/L. To determine compliance with 41.8(1)*"b,"* the detection limit shall not exceed 3 pCi/L.

(2) To determine compliance with 41.8(2), the detection limits shall not exceed the concentrations listed in the table below.

TABLE — Detection Limits for Man-Made Beta Particle and Photon Emitters

Radionuclide	Detection Limit
Tritium	1,000 pCi/L
Strontium-89	10 pCi/L
Strontium-90	2 pCi/L
Iodine-131	1 pCi/L
Cesium-134	10 pCi/L
Gross beta	4 pCi/L
Other radionuclides	1/10 of the applicable limit

d. Calculating compliance with radionuclide MCLs. To determine compliance with the maximum contaminant levels listed in 41.8(1) and 41.8(2), averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.

41.9(2) *Monitoring frequency for radioactivity in community water systems.*

a. Monitoring requirements for gross alpha particle activity, radium-226 and radium-228.

(1) Initial monitoring requirement and period. Initial sampling to determine compliance with 41.8(1) shall begin by June 24, 1979, and the analysis shall be completed by June 24, 1980. Compliance shall be based on the analysis of an annual composite of four consecutive quarterly samples or the average of the analyses of four samples obtained at quarterly intervals.

A gross alpha particle activity measurement may be substituted for the required radium-226 and radium-228 analysis, provided that the measured gross alpha particle activity does not exceed 5 pCi/L at a confidence level of 95 percent (1.65 sigma where sigma is the standard deviation of the net counting rate of the sample). In localities where radium-228 may be present in drinking water,radium-226 or radium-228 analyses are required when the gross alpha particle activity exceeds 2 pCi/L.

When the gross alpha particle activity exceeds 5 pCi/L, the same or an equivalent sample shall be analyzed for radium-226. If the concentration of radium-226 exceeds 3 pCi/L, the same or an equivalent sample shall be analyzed for radium-228.

(2) Data substitution for initial requirement. For the initial analysis required by 41.9(2)*"a"*(1), data acquired on or after June 24, 1976, may be substituted at the discretion of the department.

(3) Monitoring requirements. Suppliers of water shall monitor at least once every four years following the procedure required by 41.9(2)*"a"*(1). At the discretion of the department, when an annual record taken in conformance with 41.9(2)*"a"*(1) has established that the average annual concentration is less than half the maximum contaminant levels established by 41.8(1), analysis of a single sample may be substituted for the quarterly sampling procedure required by 41.9(2)*"a"*(1).

More frequent monitoring shall be conducted when requested by the department in the vicinity of mining or other operations which may contribute alpha particle radioactivity to either surface or groundwater sources of drinking water.

A supplier of water shall monitor in conformance with 41.9(2)*"a"*(1) within one year of the introduction of a new water source for a community water system. More frequent monitoring shall be conducted when requested by the department in the event of possible contamination or when changes in the distribution system or treatment processing occur which may increase the concentration of radioactivity in finished water.

A community water system using two or more sources having different concentrations of radioactivity shall monitor source water, in addition to water from a free-flowing tap, when requested by the department.

Monitoring for compliance with 41.8(1) after the initial period need not include radium-228 except when required by the department, provided that the average annual concentration of radium-228 has been assayed at least once using the quarterly sampling procedure required by 41.9(2)*"a"*(1).

Suppliers of water shall conduct annual monitoring of any community water system in which the radium-226 concentration exceeds 3 pCi/L, when requested by the department.

(4) Exceedance of the MCL. If the average annual maximum contaminant level for gross alpha particle activity or total radium as set forth in 41.8(1) is exceeded, the supplier of a community water system shall notify the public as required by 567—42.1(455B). Monitoring at quarterly intervals shall be continued until the annual average concentration no longer exceeds the maximum contaminant level or until a monitoring schedule as a condition of an operation permit or enforcement action shall become effective.

b. Monitoring requirements for man-made radioactivity in community water systems.

(1) Applicability and initial monitoring requirements. Systems using surface water sources and serving more than 100,000 persons and such other community water systems as are designated by the department shall be monitored for compliance with 41.8(2) by analysis of a composite of four consecutive quarterly samples. Compliance with 41.8(2) may be assumed without further analysis if the average annual concentration of gross beta particle activity is less than 50 pCi/L and if the average annual concentrations of tritium and strontium-90 are less than those listed in the detection limits table, provided, that if both radionuclides are present, the sum of their annual dose equivalents to bone marrow shall not exceed 4 millirem/year.

If the gross beta particle activity exceeds 50 pCi/L, an analysis of the sample must be performed to identify the major radioactive constituents present, and the appropriate organ and total body doses shall be calculated to determine compliance with 41.8(2).

Suppliers of water shall conduct additional monitoring, as requested by the department, to determine the concentration of man-made radioactivity in principal watersheds designated by the department.

At the discretion of the department, suppliers of water utilizing only groundwaters may be required to monitor for man-made radioactivity.

(2) Data substitution for initial requirement. For the initial analysis required by 41.9(2)*"b"*(1), data acquired on or after June 24, 1976, may be substituted at the discretion of the department.

(3) Monitoring requirement. After the initial analysis required by 41.9(2)*"b"*(1), suppliers of water shall monitor at least every four years following the procedure given in 41.9(2)*"b"*(2).

(4) Monitoring requirements for PWSs receiving effluent from nuclear facilities. The supplier of any community water system designated by the department as utilizing water contaminated by effluents from nuclear facilities shall initiate quarterly monitoring for gross beta particle and iodine-131 radioactivity and annual monitoring for strontium-90 and tritium.

Quarterly monitoring for gross beta particle activity shall be based on the analysis of monthly samples or the analysis of a composite of three monthly samples. The former is recommended. If the gross beta particle activity in a sample exceeds 15 pCi/L, the same or an equivalent sample shall be analyzed for strontium-89 and cesium-134. If the gross beta particle activity exceeds 50 pCi/L, an analysis of the sample must be performed to identify the major radioactive constituents present and the appropriate organ and total body doses shall be calculated to determine compliance with 41.8(2).

For iodine-131, a composite of five consecutive daily samples shall be analyzed once each quarter. As requested by the department, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water.

Annual monitoring for strontium-90 and tritium shall be conducted by means of the analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples. The latter procedure is recommended.

The department may allow the substitution of environmental surveillance data taken in conjunction with a nuclear facility for direct monitoring of man-made radioactivity by the supplier of water where the department determines such data is applicable to a particular community water system.

(5) Exceedance of the MCL. If the average annual maximum contaminant level for man-made radioactivity set forth in 41.8(2) is exceeded, the operator of a community water system shall give notice to the public as required by 567—42.1(455B). Monitoring at monthly intervals shall be continued until the concentration no longer exceeds the maximum contaminant level or until a monitoring schedule as a condition of an operation permit or enforcement action becomes effective.

567—41.10(455B) Reporting, public notification and record keeping. Rescinded IAB 8/11/99, effective 9/15/99.

567—41.11(455B) Unregulated contaminant monitoring.

41.11(1) *Unregulated monitoring for organic chemicals (VOCs).*

a. Applicability. Community and nontransient noncommunity water systems shall monitor for the contaminants listed in 41.11(1)*"b."*

b. Volatile organic chemical contaminants (VOCs). Community water systems and nontransient, noncommunity water systems shall monitor for the following contaminants except as provided in 41.11(1)*"c"*(4) of this subrule:

(1) Chloroform
(2) Bromodichloromethane
(3) Chlorodibromomethane
(4) Bromoform
(5) Dibromomethane
(6) m-Dichlorobenzene
(7) 1,1-Dichloropropene
(8) 1,1-Dichloroethane
(9) 1,1,2,2-Tetrachloroethane
(10) 1,3-Dichloropropane
(11) Chloromethane
(12) Bromomethane
(13) 1,2,3-Trichloropropane
(14) 1,1,1,2-Tetrachloroethane
(15) Chloroethane
(16) 2,2-Dichloropropane
(17) o-Chlorotoluene
(18) p-Chlorotoluene
(19) Bromobenzene
(20) 1,3-Dichloropropene

c. Special organic chemical (VOC) monitoring protocol.

(1) Surface water monitoring requirements. Surface water systems shall sample at entry points to the distribution system after any application of treatment. The minimum number of samples is one year of quarterly samples per water source.

(2) Groundwater monitoring requirements. Groundwater systems shall sample at points of entry to the distribution system representative of each well after any application of treatment. The minimum number of samples is one sample per entry point of the distribution system.

(3) Confirmation samples. The department may require confirmation samples for positive or negative results.

(4) Rescinded IAB 10/18/00, effective 11/22/00.

(5) VOC discretionary compounds. Monitoring for the following list of VOC compounds is required at the discretion of the department. The requirement for a PWS to monitor for the discretionary compounds will be listed in their operation permit, issued by the department.

Bromochloromethane
n-Butylbenzene
sec-Butylbenzene
tert-Butylbenzene
Dichlorodifluoromethane
Fluorotrichloromethane
Hexachlorobutadiene
Isopropylbenzene
p-Isopropyltoluene
Naphthalene
n-Propylbenzene
1,2,3-Trichlorobenzene
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene

(6) Small system monitoring waivers. Instead of performing the monitoring required by this subrule, a community water system or nontransient noncommunity water system serving fewer than 150 service connections may send a letter to the department stating that its system is available for sampling. The letter must be sent to the state no later than January 1, 1991. The system is not required to submit samples to a certified laboratory for analysis, unless requested to do so by the department.

(7) Repeat monitoring. All community and nontransient, noncommunity water systems shall repeat the unregulated contaminant monitoring required in this subrule no less frequently than every five years from the dates specified in 41.11(1)*"a."*

(8) Composite samples. The department may reduce the total number of samples a system must analyze by allowing the use of compositing. Composite samples from a maximum of five sampling points are allowed (for the substances in 41.11(1)*"b"* or *"c"*). Compositing of samples must be done in the laboratory and the composite sample must be analyzed within 14 days of collection. If the population served by the system is greater than 3,300 persons, then compositing may only be permitted by the department at sampling points within a single system. In systems serving less than or equal to 3,300 persons, the department may permit compositing among different systems provided the five-sample limit is maintained.

d. Analytical methods.

(1) Methodology references. Analysis under this subrule shall be conducted using the recommended methods as follows, or their equivalent as determined by the department and EPA: 502.2, "Volatile Organic Compounds in Water by Purge and Trap Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series," or 524.2, "Volatile Organic Compounds in Water by Purge and Trap Capillary Column Gas Chromatography/Mass Spectrometry." These methods are contained in "Methods for the Determination of Organic Compounds in Finished Drinking Water and Raw Source Water," September 1986, available from the Drinking Water Public Docket or the National Technical Information Service (NTIS), NTIS PB91-231480 and PB91-146027, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161. The toll-free number is 800-336-4700. Analysis for bromodichloromethane, bromoform, chlorodibromomethane, and chloroform also may be conducted by EPA Method 551, and analysis for 1,2,3-trichloropropane also may be conducted by EPA Method 504.1.

(2) Certified laboratory requirements. Analysis under this subrule shall only be conducted by laboratories certified under 567—Chapter 83.

41.11(2) *Inorganic and organic unregulated contaminants monitoring.*

a. Applicability. Monitoring for unregulated contaminants. Monitoring of the contaminants listed in 41.11(2)*"b"* and 41.3(1)*"f"* shall be conducted as follows:

(1) Sampling for unregulated organic contaminants. Each community and nontransient noncommunity water system shall take four consecutive quarterly samples at each source/entry point for each contaminant listed in 41.11(2)*"b"* and report the results to the department. Monitoring must be completed by December 31, 1995, and take place during the calendar quarter which is specified by the department.

(2) Sampling for unregulated inorganic contaminants. Each community and nontransient noncommunity water system shall take one sample at each source/entry point for each contaminant listed in 41.3(1)*"f"* and report the results to the department. Monitoring must be completed by December 31, 1995, using the methodology specified in 41.3(1)*"f."*

b. Unregulated organic chemical (SOC) contaminants. Systems shall monitor for the unregulated contaminants listed below, using the methods identified below and using the analytical test procedures contained within Technical Notes on Drinking Water Methods, EPA-600/R-94-173, October 1994, which is available at NTIS, PB95-104766. Method 6610 shall be followed in accordance with the Standard Methods for the Examination of Water and Wastewater, 18th edition Supplement, 1994, American Public Health Association. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR Part 51, effective January 4, 1995. Copies of methods listed in Standard Methods for the Examination of Water and Wastewater may be obtained from the American Public Health Association, 1015 Fifteenth Street NW, Washington, DC 20005. Copies may be inspected at EPA's Drinking Water Docket, 401 M Street SW, Washington, DC 20460; or at the Office of the Federal Register, 800 North Capitol Street NW, Suite 700, Washington, DC.

UNREGULATED ORGANIC CONTAMINANTS
AND METHODOLOGY

Organic Contaminants	EPA Analytical Method
Aldicarb	531.1, 6610
Aldicarb sulfone	531.1, 6610
Aldicarb sulfoxide	531.1, 6610
Aldrin	505, 508, 508.1, 525.2
Butachlor	507, 525.2
Carbaryl	531.1, 6610
Dicamba	515.1, 515.2, 555
Dieldrin	505, 508, 508.1, 525.2
3-Hydroxycarbofuran	531.1, 6610
Methomyl	531.1, 6610
Metolachlor	507, 508.1, 525.2
Metribuzin	507, 508.1, 525.2
Propachlor	507, 508.1, 525.2

c. Monitoring protocols.

(1) Groundwater sampling protocols. Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment. Each sample must be taken at the same source/entry point unless conditions make another sampling point more representative of each source or treatment plant.

(2) Surface water sampling protocols. Surface water systems shall take a minimum of one sample at each entry point to the distribution system after treatment. Each sample must be taken at the same source/entry point unless conditions make another sampling point more representative of each source or treatment plant. For purposes of this subparagraph, surface water systems include systems with a combination of surface and ground sources.

(3) Multiple sources. If the system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water representative of all sources is being used). If a representative sample of all water sources cannot be obtained, as determined by the department, separate source/entry points with the appropriate monitoring requirements will be assigned by the department.

(4) Sampling waivers. Each community and nontransient noncommunity water system may apply to the department for a waiver from the requirements of 41.11(2)*"c"*(1) and (2).

(5) Bases of sampling waivers. The department may grant a waiver for the requirements of 41.11(2)*"a"*(1) based on the criteria specified in 41.3(455B) and 41.5(455B). The department may grant a waiver from the requirement of 41.11(2)*"a"*(2) if previous analytical results indicate contamination would not occur, provided this data was collected after January 1, 1990.

(6) Confirmation sampling. A confirmation sample for positive or negative results may be required by the department.

(7) Composite sampling. The department may reduce the total number of samples a system must analyze by allowing the use of compositing. Composite samples from a maximum of five sampling points are allowed. Compositing of samples must be done in the laboratory and the composite sample must be analyzed within 14 days of collection. If the population served by the system is greater than 3,300 persons, then compositing may only be permitted by the department at sampling points within a single system. In systems serving less than or equal to 3,300 persons, the department may permit compositing among different systems provided the five-sample limit is maintained.

(8) Small system exemptions. Instead of performing the monitoring required by this subrule, a community water system or nontransient noncommunity water system serving fewer than 150 service connections may send a letter stating that the system is available for sampling. This letter must be sent by January 1, 1994. The system shall not send such samples, unless requested to do so by the department.

41.11(3) *Special monitoring for sodium.* Suppliers of water for community public water systems shall collect and have analyzed one sample per source or plant, for the purpose of determining the sodium concentration in the distribution system. Systems utilizing multiple wells, drawing raw water from a single aquifer may, with departmental approval, be considered as one source for determining the minimum number of samples to be collected. Sampling frequency and approved analytical methods are as follows:

a. Surface water systems. Systems utilizing a surface water source, in whole or in part, shall monitor for sodium at least once annually at the entry point to the distribution system;

b. Groundwater systems. Systems utilizing groundwater sources shall monitor at least once every three years at the entry point to the distribution system;

c. Increased monitoring. Suppliers may be required to monitor more frequently where sodium levels are variable;

d. Analytical methodology. Analyses for sodium shall be performed in accordance with 41.3(1)*"e"*(1).

e. Reporting. The sodium level shall be reported to the public by at least one of the following methods:

(1) The community public water supply shall notify the appropriate local public health officials of the sodium levels by written notice by direct mail within three months. A copy of each notice required by this subrule shall be sent to the department within ten days of its issuance.

(2) In lieu of the reporting requirement of 41.11(3)*"e"*(1), the community public water supply shall include the sodium level in its annual consumer confidence report, per 567—subparagraph 42.3(3)*"c"*(1)"12."

567—41.12(455B) Alternative analytical techniques. With the written permission of this department, concurred in by the EPA, an alternative analytical technique may be employed. An alternative technique shall be acceptable only if it is substantially equivalent to the prescribed test in both precision and accuracy as it relates to the determination of compliance with any maximum contaminant level. The use of the alternative analytical technique shall not decrease the frequency of monitoring required by 41.2(455B) through 41.8(455B).

567—41.13(455B) Monitoring of interconnected public water supply systems. When a public water supply system supplies water to one or more other public water supply systems, the department may modify the monitoring requirements imposed by this part to the extent that the interconnection of the systems justifies treating them as a single system for monitoring purposes. Any modified monitoring shall be conducted pursuant to a schedule specified by the department and concurred in by the administrator of the U.S. Environmental Protection Agency.

567—41.14(455B) Department analytical results used to determine compliance. Analytical results or other information compiled by departmental staff may be used to determine compliance with the maximum contaminant levels, action levels, or treatment techniques listed in 567—Chapters 41 and 43 or for initiating remedial action with respect to these violations.

567—41.15(455B) Monitoring of other contaminants. If the department determines that other contaminants are present in a public water supply, and the contaminants are known to pose, or scientific evidence strongly suggests that they pose, a threat to human health, the supplier of water may be required to monitor for such contaminants. The supplier of water will monitor at a frequency and in a manner which will adequately identify the magnitude and extent of the contamination. The monitoring frequency and sampling location will be determined by the department. All analytical results will be obtained using approved EPA methods and all analytical results will be submitted to the department for review and evaluation. Any monitoring required under this paragraph will be incorporated into an operation permit or an order.

These rules are intended to implement Iowa Code sections 455B.171 through 455B.188 and 455B.190 through 455B.192.

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